

## Patent Claims

1. A method for thermally working a workpiece consisting of a ferromagnetic  
5 material by means of a thermal working tool (1) which is moveable along a work-  
piece surface (7), wherein an alternating magnetic field is produced for controlling  
a working distance (A) between said working tool (1) and said workpiece surface  
(7), said magnetic field acting both in the area of said workpiece surface (7) and in  
a sensor body with ferromagnetic properties above said workpiece surface (7),  
10 said magnetic field or changes thereof being sensed by means of a measuring  
device (9; 10), and measurement signals of said measuring device (9; 10) being  
evaluated for controlling said working distance (A), characterized in that said torch  
head (2) and at least one of the cutting or welding tools (3, 4; 5) are used as sen-  
sor body (2; 3; 4; 5).

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2. The method according to claim 1, characterized in that said magnetic field  
is produced by means of an exciting coil (6) through which said sensor body (2; 3;  
4; 5) extends such that magnetic field lines (13) are running through said body  
above and below a cross-sectional plane through which a central coil plane (14) of  
20 said exciting coil (6) extends, and that said magnetic field lines (13) above said  
coil plane (14) are sensed by means of an upper measuring element (9), a first  
measurement signal being produced that has a first amplitude and a first phase,  
and that said magnetic field lines (13) below said coil plane (14) are sensed by  
means of a lower measuring element (10), a second measurement signal being  
25 produced that has a second amplitude and a second phase, the relative position  
between first phase and second phase being determined, and a phase shift being  
used for controlling the working distance (A).

3. The method according to claim 2, characterized in that said upper measur-  
30 ing element is designed as an upper measuring coil (9) and said lower measuring  
element as a lower measuring coil (20), and that said upper measuring coil (9) and

said lower measuring coil (10) are interconnected such that said first amplitude and said second amplitude mutually compensate one another at least in part.

4. The method according to claim 3, characterized in that an exciting coil (6) is  
5 used which coaxially extends around a central axis (8) of said sensor body (2; 3; 4; 5).

5. A thermal working machine for working a workpiece consisting of a ferro-  
magnetic material, comprising a thermal working tool (1) which is movable along a  
10 workpiece surface (7) and comprises a torch head (2) which has exchangeably  
mounted thereon cutting or welding tools (3; 4; 5) extending between said torch  
head (2) and said workpiece surface (7), and comprising a distance controller for  
setting a predetermined working distance (A) between said working tool (1) and  
said workpiece surface (7), said distance controller including an exciting element  
15 (6) that is movable with said working tool (1) for producing a magnetic field which  
is effective in a sensor body with ferromagnetic properties above said workpiece  
surface (7) and in the area of said workpiece surface (7), a measuring device (9,  
10) for sensing said magnetic field or changes thereof, and an evaluating unit (21-  
27) by means of which measurement signals of said measuring device are evalu-  
20 ated for setting a control variable of said distance controller, characterized in that  
said torch head (2) and at least one of said cutting or welding tools (3; 4; 5) con-  
tain ferromagnetic material and form at least part of said sensor body (2; 3; 4; 5).

6. The working machine according to claim 5, characterized in that said excit-  
25 ing element is designed as an exciting coil (6) through which said sensor body (2;  
3; 4; 5) extends such that magnetic field lines (13) extend therein above and below  
a cross-sectional surface which includes the central coil plane (14) of said exciting  
coil (6), an upper measuring element (9) and a lower measuring element (10) be-  
ing provided, and said upper measuring element (9) extending in the area above  
30 said central coil plane (14), and said lower measuring element (10) in the area  
below said central coil plane (14).

7. The working machine according to claim 6, characterized in that said measuring elements are designed in the form of an upper measuring coil (9) and a lower measuring coil (10), said upper measuring coil (9), said lower measuring coil (10) and said exciting coil (6) having a joint central axis (8) in which said sensor  
5 body (2; 3; 4; 5) extends.

8. The working machine according to claim 7, characterized in that said upper measuring coil (9) and said lower measuring coil (10) are designed such that the voltages produced in said measuring coils (9; 10) compensate one another in the  
10 working position of said working tool (1).

9. The working machine according to any one of the preceding claims 5 to 8, characterized in that said torch head (2) and at least one of said cutting or welding tools (3; 4; 5) consist of ferromagnetic material.

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10. A cutting or welding tool for use in a working tool for the thermal working machine according to any one of claims 5 to 9, said tool being exchangeably mounted on a torch head (2), characterized in that said cutting or welding tool (3; 4; 5) consists of ferromagnetic material.